Research for Conservation: Marine Mammals

NOAA FISHERIES
Southeast Fisheries Science Center

SEFSC Protected Species Program Review

25-27 August 2015
Miami, Florida

Research for Conservation – Applications

- Additional needs for conservation science:
  - Endangered Species Act Status Review
  - Endangered Species Act Recovery Planning
  - Section 7 Consultations
  - Federal agency environmental impacts statements and incidental take authorizations
  - Stranding networks
  - Take Reduction Teams

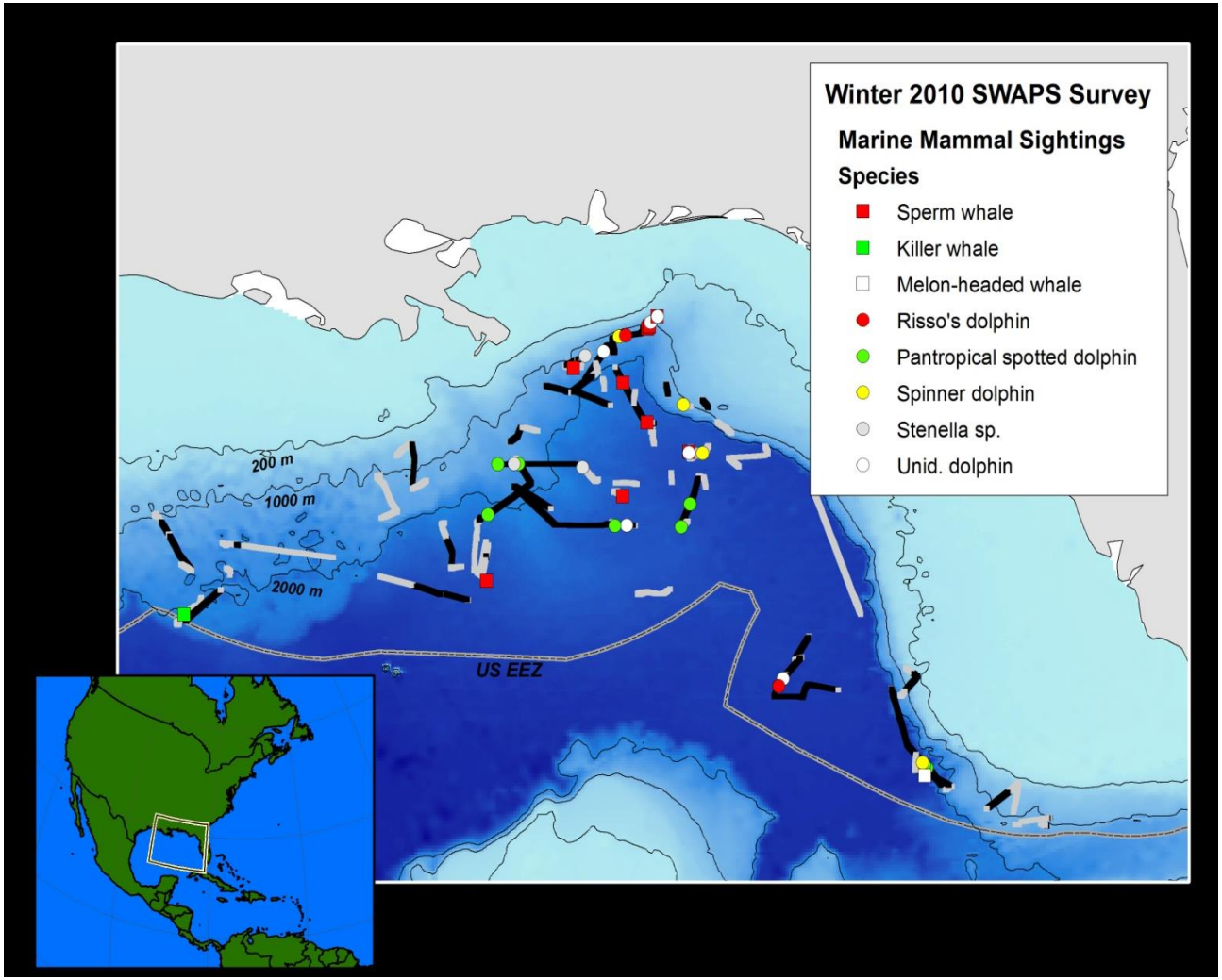
Research for Conservation – SEFSC Activities

- In this presentation, we are going to focus on contributions to conservation science outside of stock assessment triumvirate of stocks structure, abundance and mortality
- Overview of the following activities:
  - Gulf of Mexico sperm whale habitat studies
  - North Atlantic right whales
  - Addressing taxonomic uncertainty
  - Assigning dolphins to stock
  - Genetic species identification

Sperm Whale Habitat Studies

- Two projects through Interagency Agreements with BOEM focusing on Gulf of Mexico Sperm Whale habitat studies
- Mid-water prey study building on previous studies of sperm whale habitat in the Northern Gulf
- Identify the occurrence and habitat use of sperm whales in the southeastern Gulf of Mexico in a potential calving area

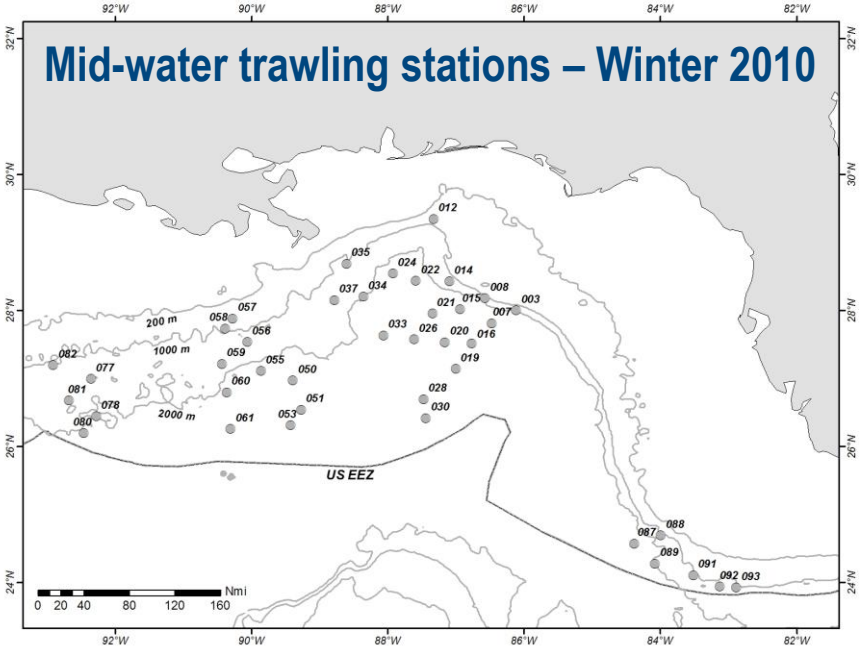
Sperm Whale Acoustic Prey Study

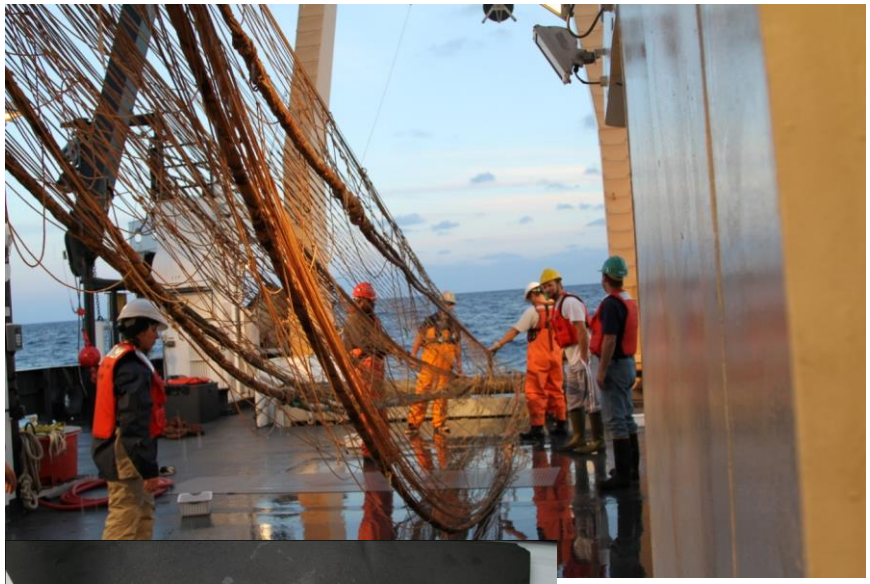


- Pilot study conducted during summer 2009, targeted survey during Feb-March 2010
- Mid-water trawling to collect mesopelagic fish and squids
- Intensive biological sampling of catch for stable isotopes and genetic analyses
- Scientific echosounder acoustic backscatter data (EK60) collected to characterize secondary productivity

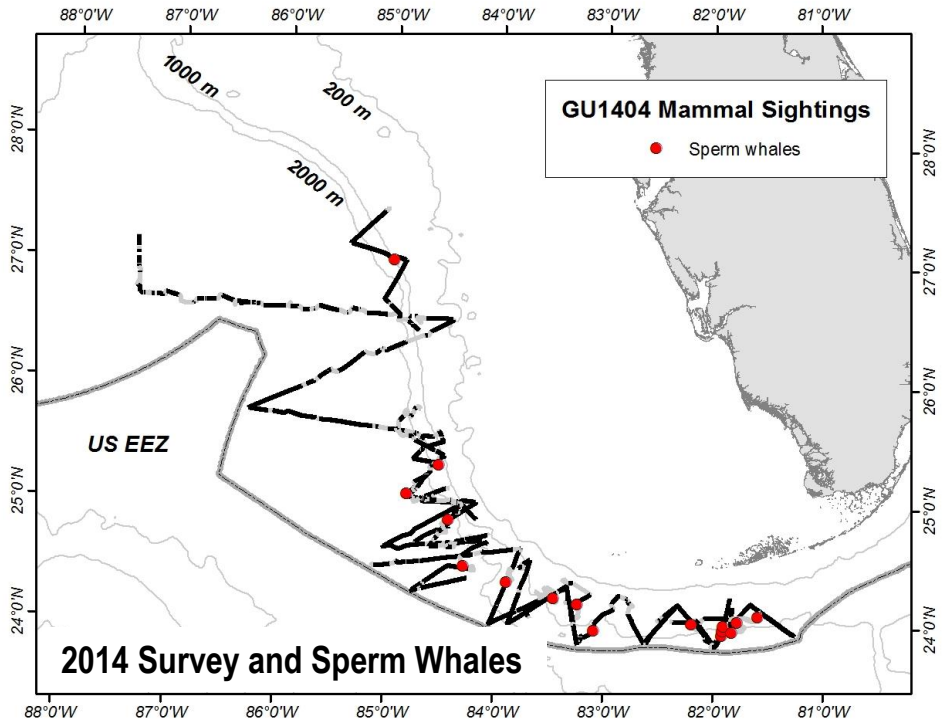
Sperm Whale Acoustic Prey Study

- >4000 squid specimens collected
- Stable isotope analysis characterize the squid species and size that are likely sperm whale prey
- Strong correlations between sperm whales, their prey, acoustic backscatter, and mesoscale physical features

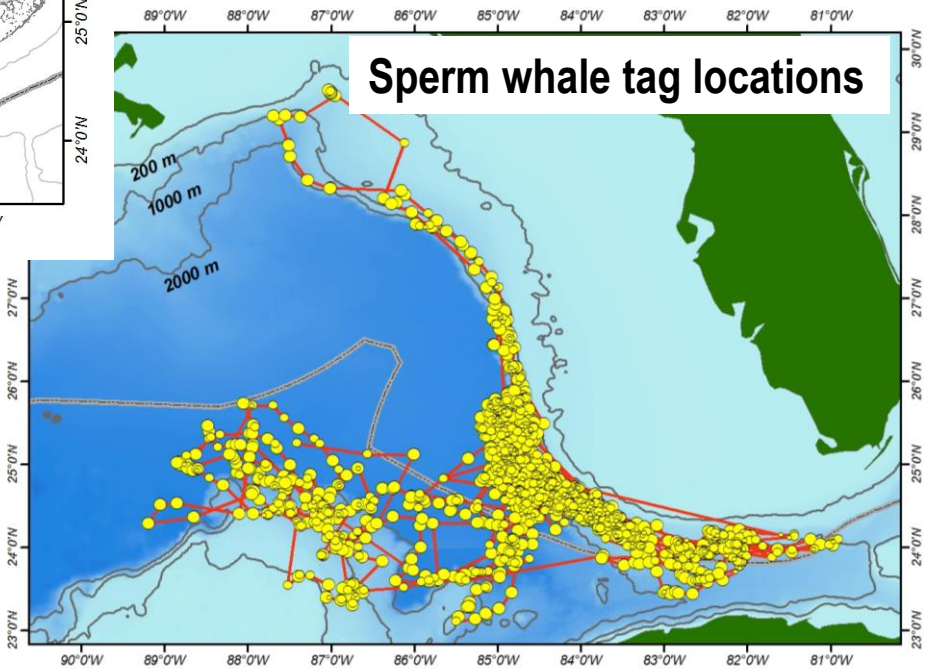




Southeast Gulf of Mexico Sperm Whales



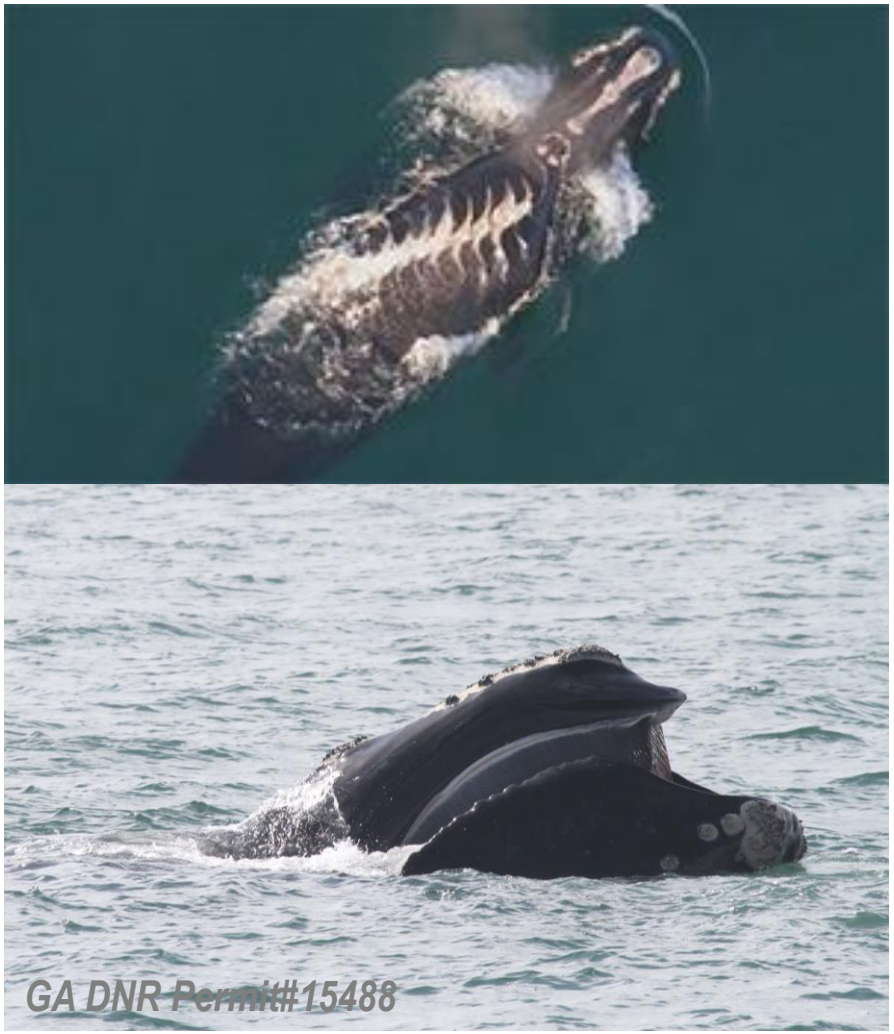
- Visual and passive acoustic surveys during 2012 and 2014
- Deployed satellite telemetry tags on 18 sperm whales
- Two long term passive acoustic monitoring buoys deployed during 2011-2014



- Inter-annual variation in sperm whale distribution related to physical features
- High proportion of sightings included calves and very young calves
- Site fidelity over several months, but one animal moved to the east coast

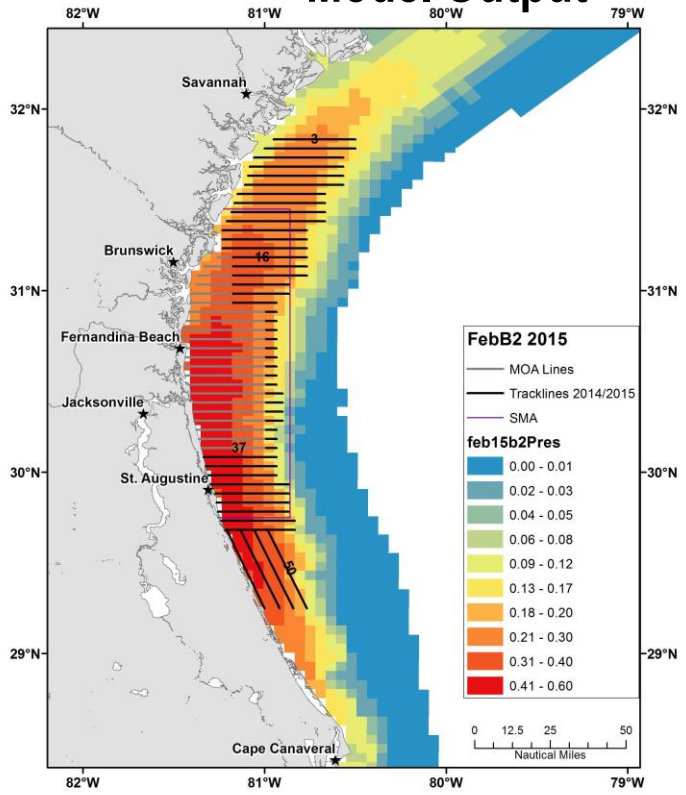
North Atlantic Right Whales: SEFSC Activities

- Analysis of aerial survey data for habitat models and survey design
- Passive acoustic monitoring
- Development of LIMPET tags for movement studies
- Participate in recovery planning (SEIT)

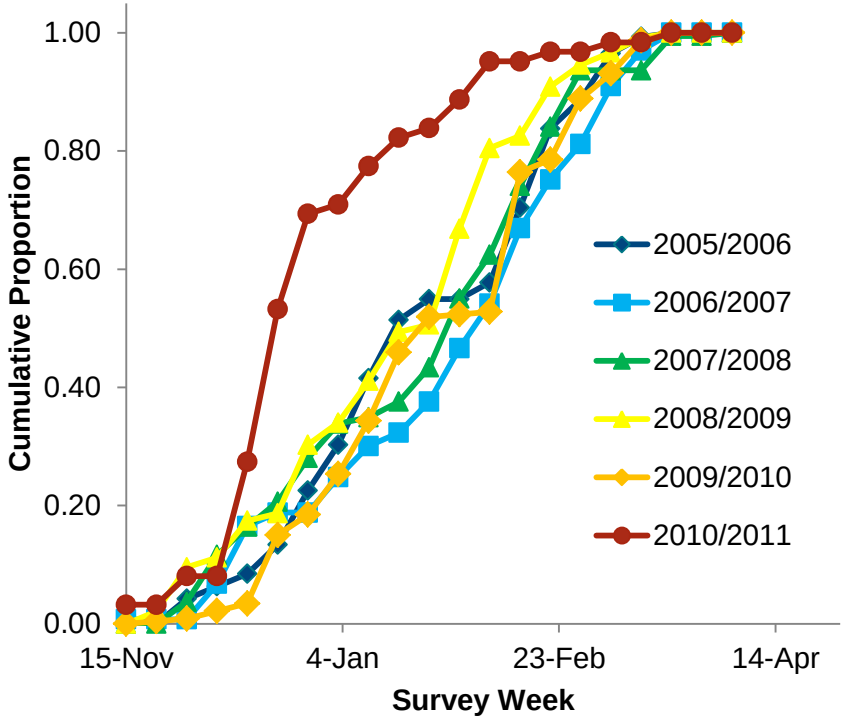


North Atlantic Right Whales: Aerial Survey Design

Aerial Survey Tracks Overlaid with Habitat Model Output



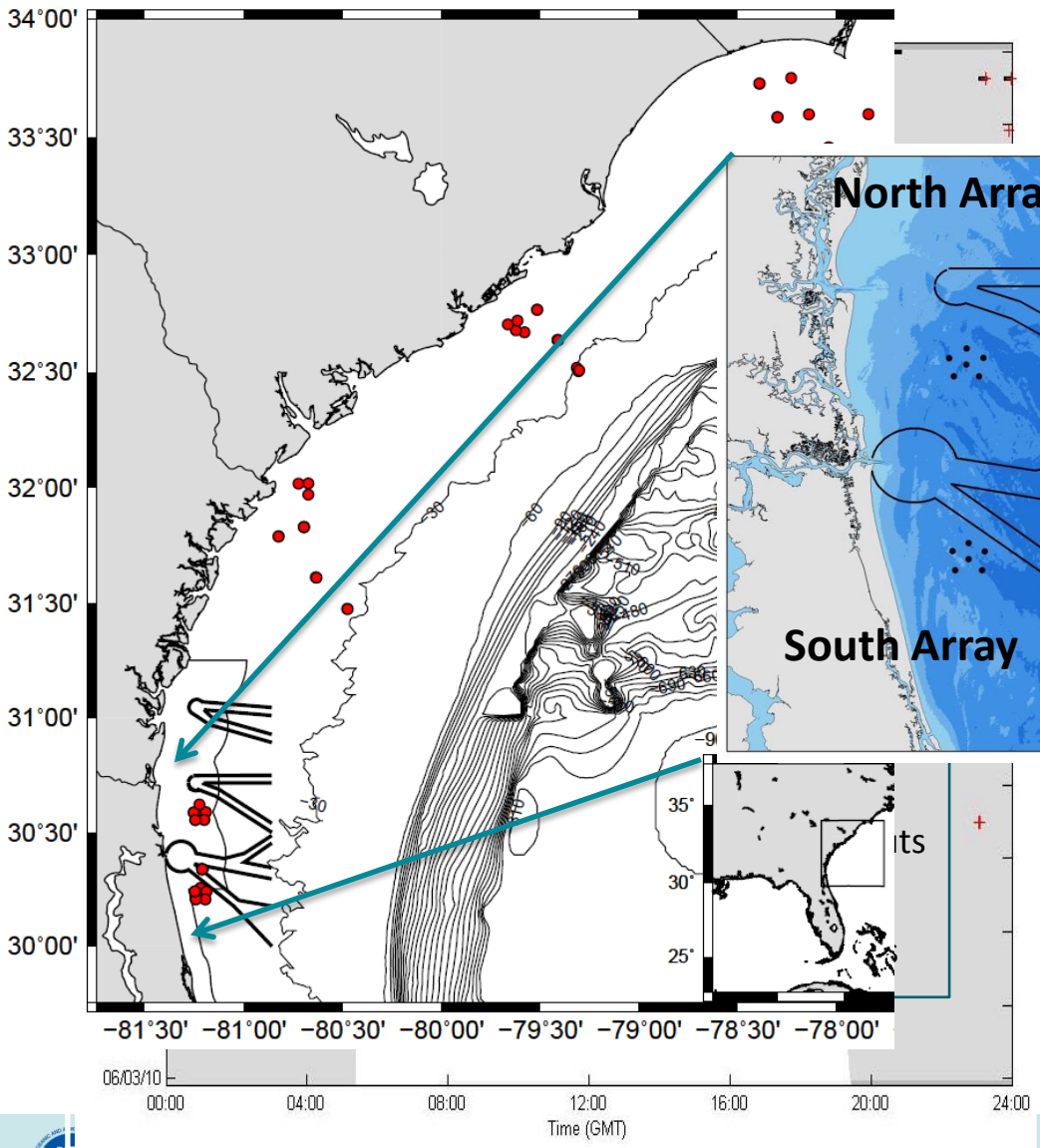
Seasonal Discovery Curves

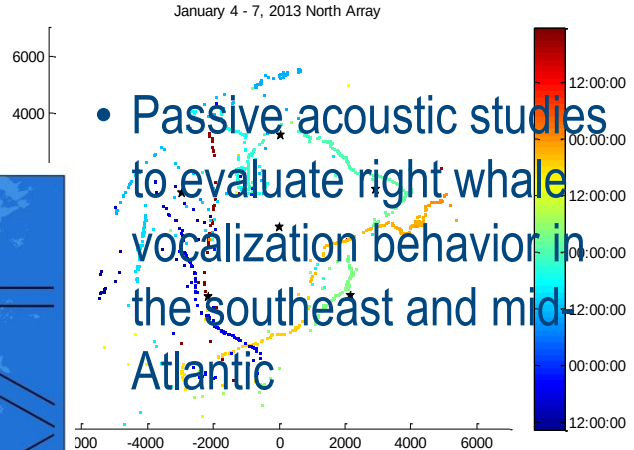


- Recent re-prioritization of aerial surveys to collect demographic data
- Analysis conducted to redesign surveys to optimize encounters with unique individuals, implementing an adaptive survey approach

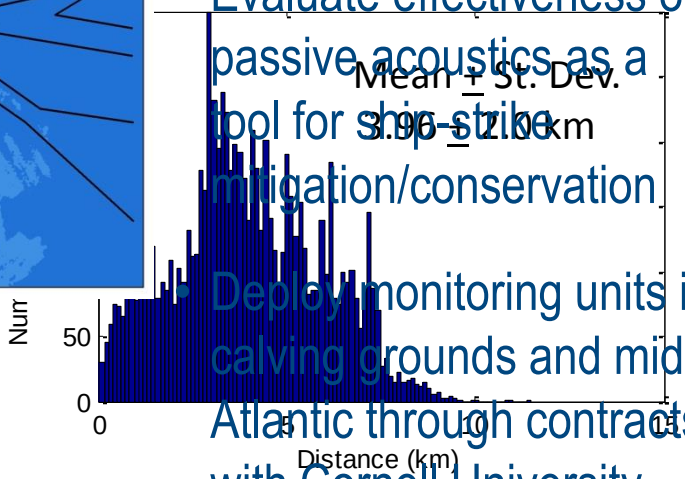
North Atlantic Right Whales: Passive Acoustics

Comparison of Two Acoustic Methods and





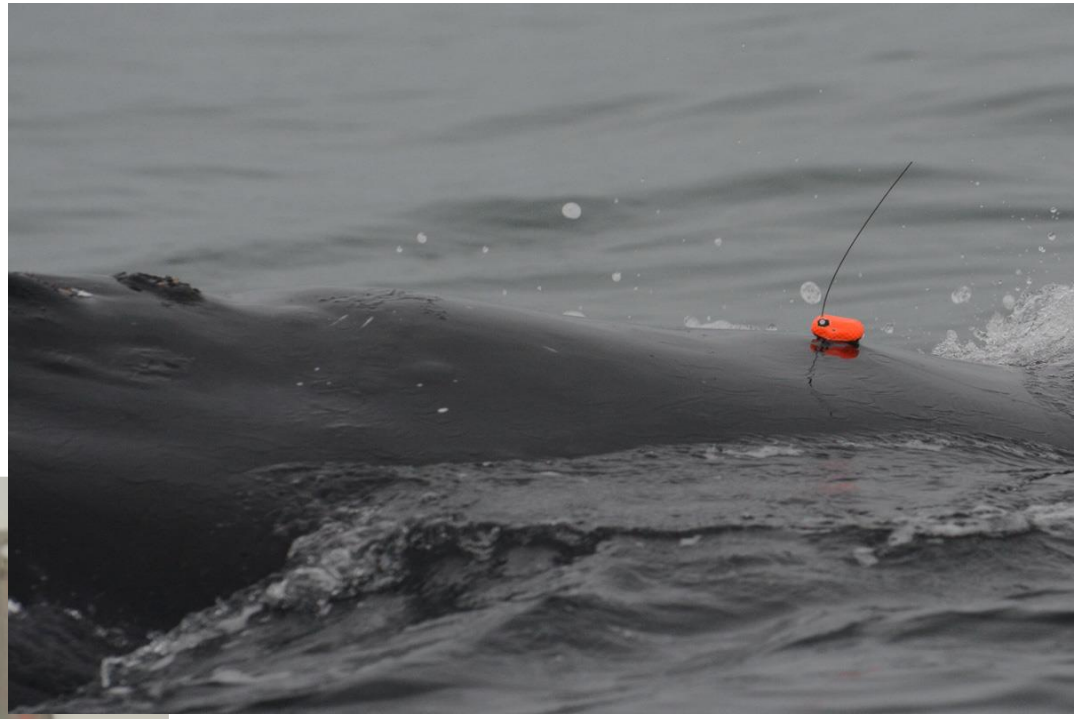
- Passive acoustic studies to evaluate right whale vocalization behavior in the southeast and mid-Atlantic
- Evaluate effectiveness of passive acoustics as a tool for ship-strike mitigation/conservation
- Deploy monitoring units in calving grounds and mid-Atlantic through contracts with Cornell University

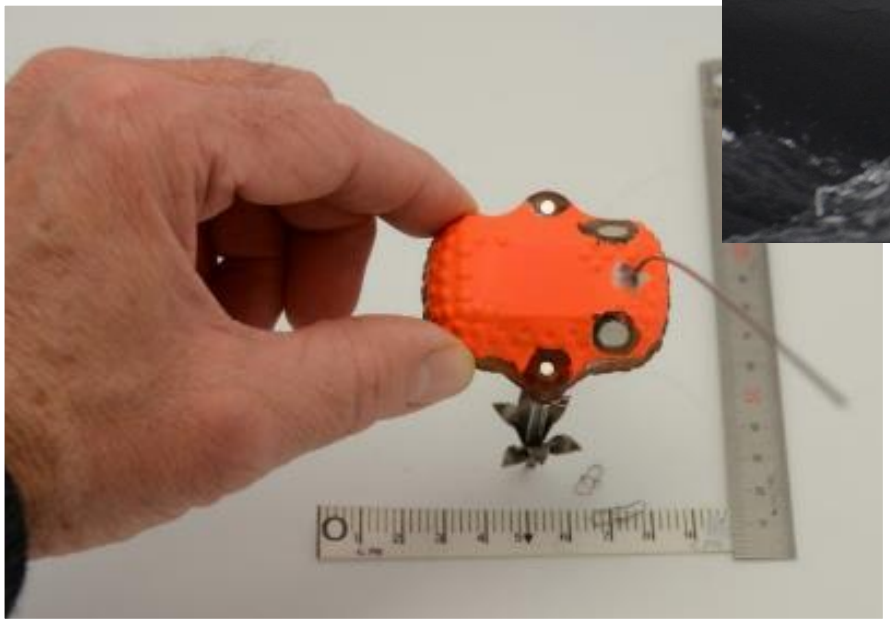


Tracking of individuals and vocalization detection distances

North Atlantic Right Whales: LIMPET Tags

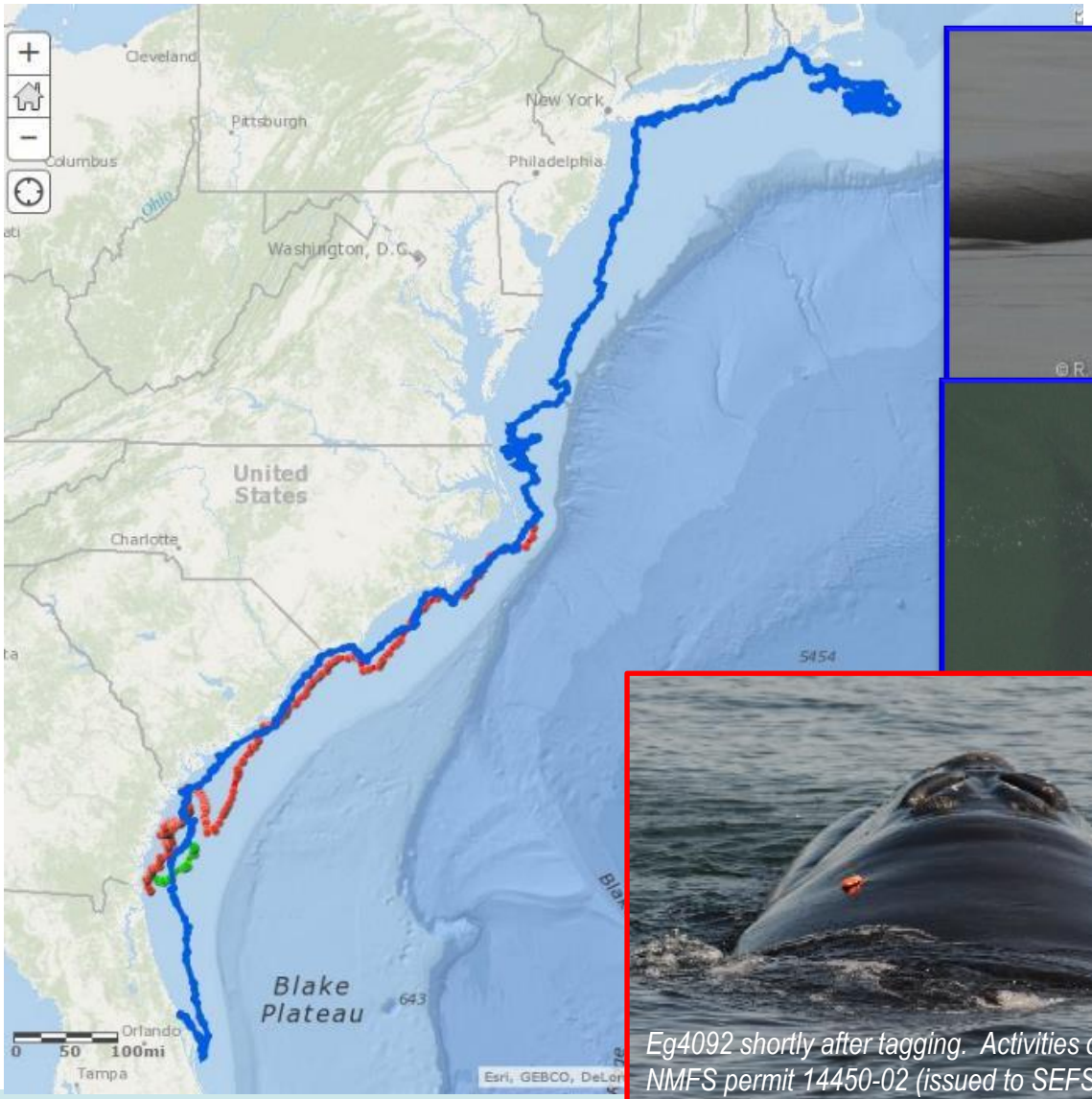
- Cooperative project with GADNR, FWRI, Alaska Sea Life Center
- Develop/improve less invasive tags for studies of movement – particularly mid-Atlantic migration route

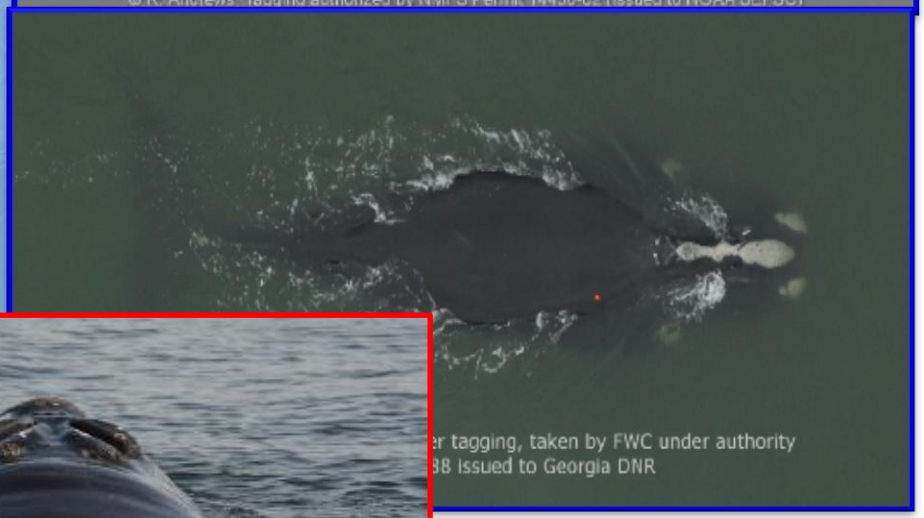




- 3 year project planned
- First year of effort this past winter

North Atlantic Right Whales: LIMPET Tags

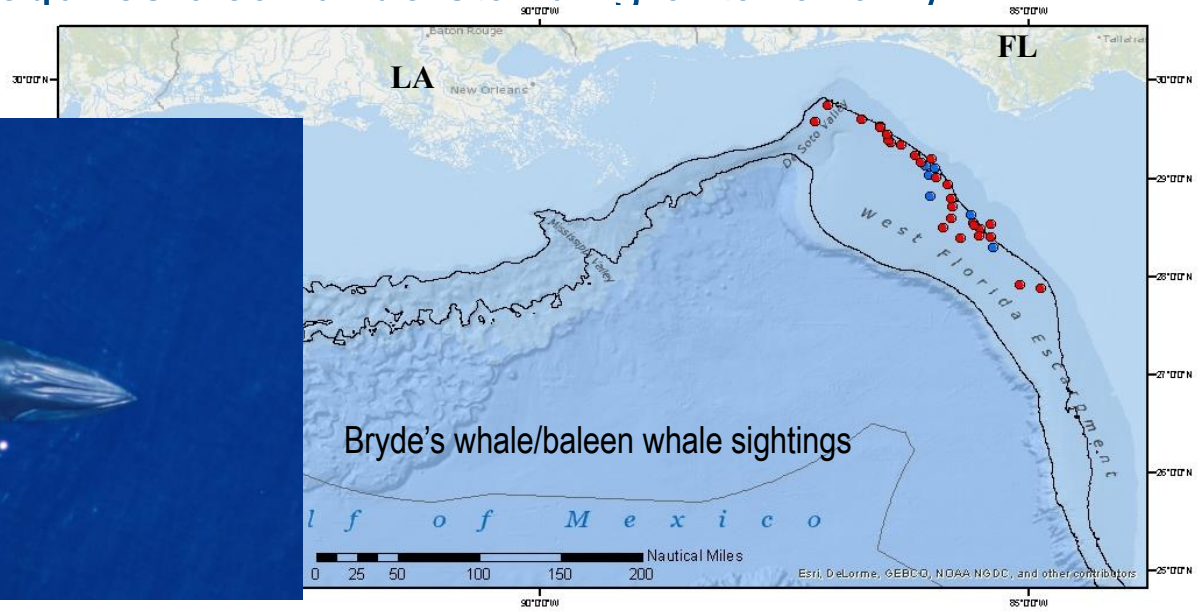




Eg4092 shortly after tagging. Activities depicted authorized by NMFS permit 14450-02 (issued to SEFSC).

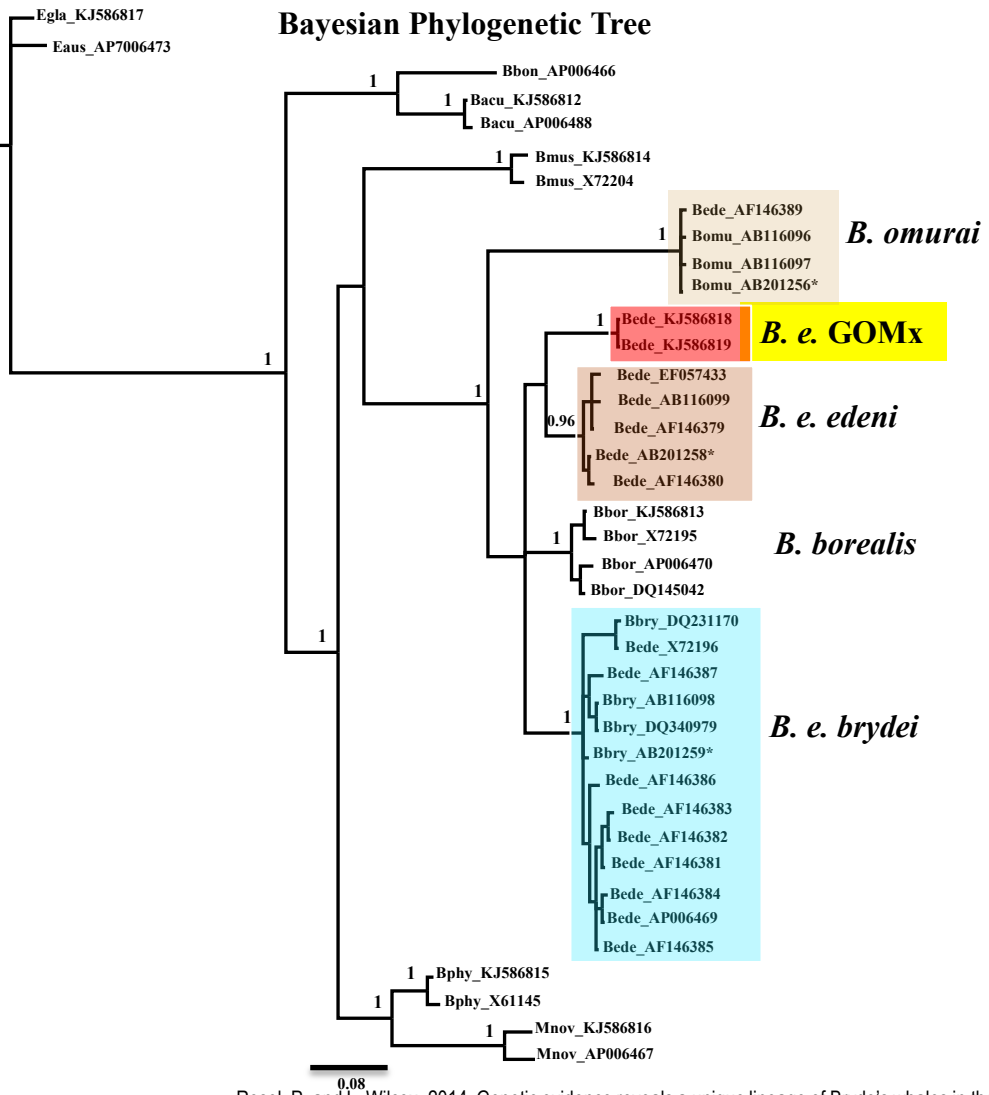
Addressing Taxonomic Uncertainty

- Two subspecies of Bryde's whales currently recognized worldwide, but have been considered species
- Small population of Bryde's whales present in northern GOMx
- Small population size increases demographic risk
- Relationship to Bryde's whales elsewhere unknown
- Protection under ESA requires clear understanding of taxonomy



Bryde's Whales in the Gulf of Mexico

- Genetic analyses
  - Significantly different from Bryde's whales worldwide
  - Unique evolutionary lineage
  - Extremely low genetic diversity
- Petitioned for listing under ESA

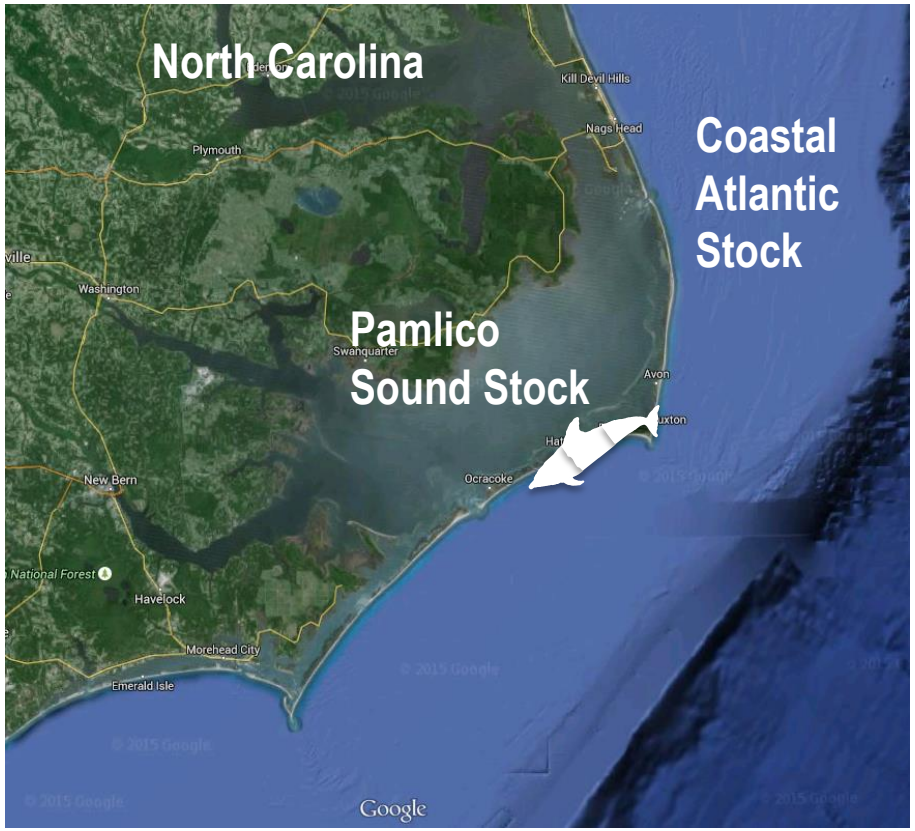


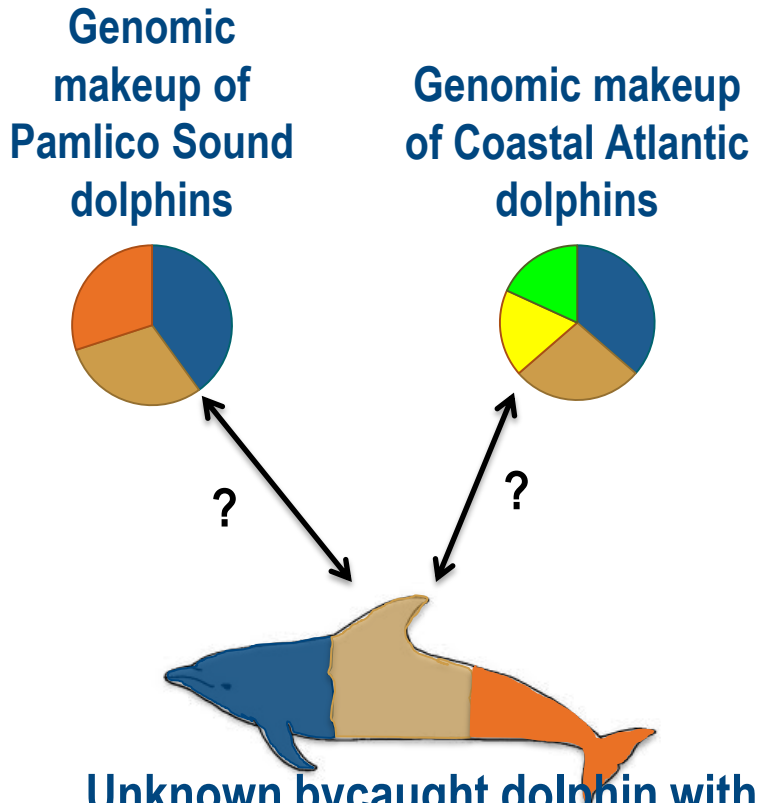
Rosel, P. and L. Wilcox. 2014. Genetic evidence reveals a unique lineage of Bryde's whales in the northern Gulf of Mexico. Endangered Species Research 25:19-34.

Genetic Assignment of Individuals to Stock of Origin

- Develop sufficient genetic markers to make assignments
- Fundamental need for mortality assessments
- Critical issue for bottlenose dolphin TRT and current Atlantic and GOMx UMEs
- A mechanism to identify whether management measures are effective
- Rehabilitated dolphins

Genetic Assignment of Individuals to Stock





Unknown bycaught dolphin with this genetic makeup is more likely to have come from Pamlico Sound based on the greater similarity of its genome to that population

Genetic Assignment of Individuals to Stock

Key components:

1) sufficient markers to have confidence in the assignments

2) appropriate sampling of all potential source populations

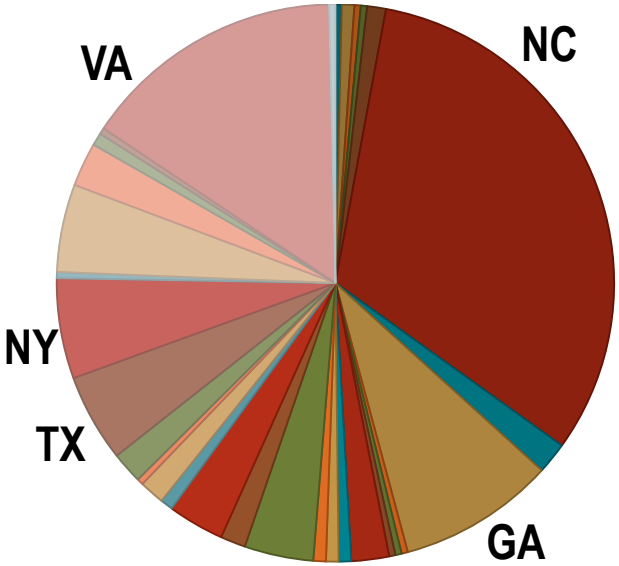
Genetic Species Identification and Sexing

- **Support for Stranding Networks**
  - Decomposition, parts
  - Difficult taxa
  - Common bottlenose dolphin morphotype
- **Molecular sexing**
  - Biopsies (contaminants, hormone studies)
  - Strandings

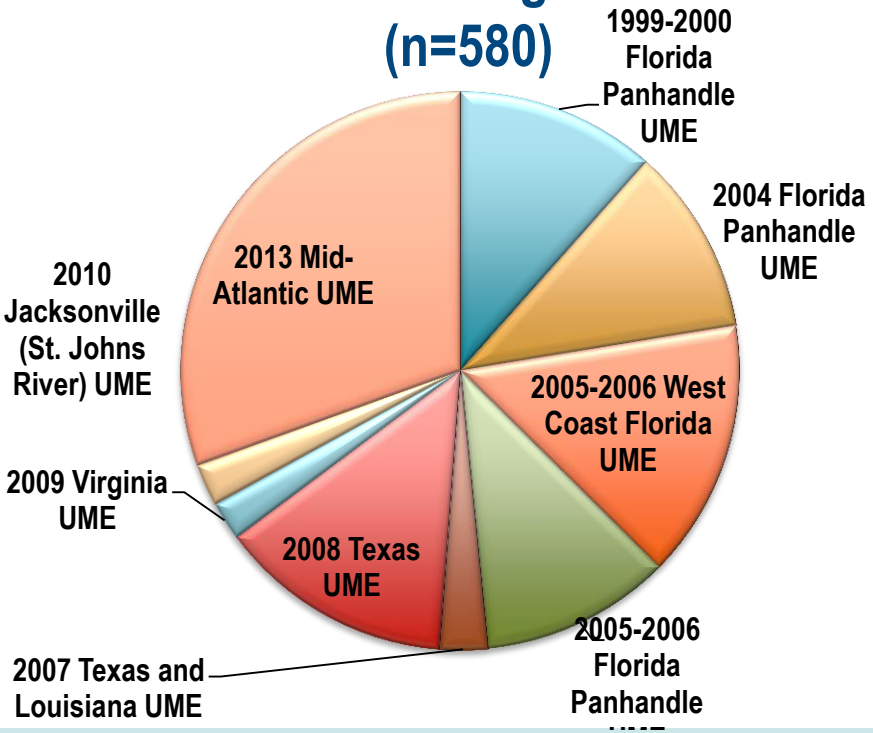
Genetic Species Identification and Sexing

- Identify best gene sequences for species ID
- Build database of sequences from individuals of known species
- Species IDs for 31 non-federal agencies, Maine to Texas, Canada, Washington

Cases by State Network Members (1999 – present (n=274)



Support for UME Investigations (n=580)



Strengths

- Diverse portfolio of activities
- Contribute significantly to conservation activities
  - Initiated status review for Bryde's whales
  - Right whale management outcomes
- Infrastructure (vessels and airplanes) to support work
- Potential improvements and efficiencies in stock assessments

Challenges

- Balancing conservation science with other program requirements
- Limited capacity to take on new projects and conduct research
- Integrating outputs into stock assessment process

Future Directions

- Continuing development of tagging capacity and capability
- Improving spatial habitat models through integration of prey/secondary production
- Integrating passive acoustics and visual data into spatial habitat models
- Exploring alternative technologies for survey data collection
- Incorporating next generation genetics tools

Discussion Topics

- Is the research we are conducting reflective of scientific best practices?
- Do you see an opportunity for SEFSC to shift resources from an existing activity to deal with an unmet need?

Genetic Species Identification and Sexing